

GAME PLAN, INC.
SHARPSHOOTER II PINBALL
(MODEL 730)
INSTALLATION
AND
REPAIR MANUAL

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INSTALLATION AND REPAIR MANUAL

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INSTALLATION

I. GENERAL INSTALLATION

Remove backbox, cabinet and legs from the shipping container. Bolts required for assembly, tilt ball and game ball are shipped inside the cashbox. Mount the legs to the cabinet. Pull the line cord through the hole in the cabinet and place it in the slot at rear of the cabinet. Place backbox on the cabinet and mount with the four bolts provided. Pull cables up through the hole in the bottom of the backbox and plug into mating connectors in backbox. Note the connectors are color coded to prevent connection errors. Connect ground braid to backbox shielding screw.

Check all connectors to ensure that none vibrated loose during shipping. Check playfield wiring and cabinet wiring for shipping damage. Check that all fuses are firmly in place. Adjust the leg levelers, check the tilt bob adjustment and insert roll-tilt ball. Lower the playfield, and place the game ball in the shooter alley.

Plug the game into a grounded outlet only of specified voltage. Do not remove the ground plug or use a cheater plug to defeat the grounding system.

The game is now ready to power up and check out. Refer to section VI, routine maintenance on location, for check out.

II. GENERAL GAME OPERATION

Turn on the on-off switch located under the cabinet near the right front leg. The displays should stay blank for approximately 7 seconds. During this time the MPU circuit board is exercising its self diagnostic routine, the game over tune will play and the displays will alternately flash zeros and high score to date.

Coin the game. The game should play the coin sound if selected

and increment the credit display. Press the credit button. The start of game sound should play if selected, the credit display should decrement, the first player should flash for the player up, ball in play 1 should be lit for number of players and the ball should be served to the shooter alley if sitting in the ball return hole.

Pressing the credit button again will cause the number of players to be incremented with each depression to a maximum of four.

III. FEATURE OPERATION & SCORING

The S-H-A-R-P lanes increment score by 1000 PTS. and advance bonus immediately for the first time the lane is made. After all lanes are made the additional bonus for lanes made more than once is awarded. The drop targets score 1000 PTS. and advance bonus.

The thumpers score 100 or 1000 when lit. They are lit by making the top stand up target for the upper left and lower top thumpers, and the bottom stand up target for the upper right and lower bottom thumper. The spinner scores 100 or 1000 when lit and lit by advancing bonus multiplier to 2X.

The loop lane rollover scores 1000 and advances bonus. The loop rollover also advances the kickout hole multiplier and awards extra ball when upper extra is lit.

The lower extra when lit lane scores 1000 PTS., advances bonus and awards extra ball when lit.

The lower special when lit lane scores 1000 PTS., advances bonus, and awards special when lit.

The kickout hole gives 5000 PTS., or 2X 3X 4X 5X times 5000 PTS. when lit, or awards special or 25,000 PTS. when lit.

The outhole bonus multiplier is advanced by making S-H-A-R-P lanes, S-H-O-O-T-E-R targets or kickout hole. Making S-H-A-R-P lanes or S-H-O-O-T-E-R targets after 5X outhole bonus is achieved lites special. Making S-H-O-O-T-E-R targets after special has been achieved causes last target down to flash for special.

All bonus for current ball is collected when ball falls in the out hole. When an extra ball is awarded it is played immediately following the ball that won it. All features with the exception of the S-H-O-O-T-E-R targets are carried over from ball to ball for each player.

Exceeding high score to date awards credits, if optioned, at the end of the game and the displayed high score to date is automatically updated.

Tilting the game results in loss of current ball and the flippers and all playfield features go dead. Slamming the machine results in loss of the game, and the game goes into a delay mode for approximately 15 seconds. The kickout is always active except during this delay. If a ball falls in the kickout hole during the slam delay it will be kicked out immediately after the delay.

At the end of the game, the game over tune plays and the match number shows in the ball play display if optioned. The game goes into a game over delay for approximately 5 seconds and then begins alternately flashing last game score and high score to date on the displays.

IV. ACCOUNTING FUNCTIONS

NOTE: The Game must be in the game over mode before entering into the accounting routine. A new accounting reset button has been added to the coin door. It provides the same function as S-33 on the MPU board.

The accounting routines are entered by pressing the test switch inside the coin door. The number of the accounting function is shown in the

ball in play display and the count for that function is shown on all four players displays. Continued pressing of that test switch will cause the game to cycle through all the accounting functions. If the game is left in one of the accounting functions, it will automatically return to game over after approximately 30 seconds.

Any accounting function can be reset by pressing S33 on the MPU board or by pressing the reset switch on the coin door. While that particular accounting function is being displayed.

Replay levels and high score to date are reset to 100,000, all other accounting functions are reset to zero.

The sequence of accounting functions are as follows:

1. Coin Counter #1
 2. Coin Counter #2
 3. Coin Counter #3
 4. Total Plays
 5. Total Replays
 - ▼6. Replay Level #1
 - *7. Replay Level #2
 - *8. Replay Level #3
 - *9. High Score To Date
 10. Number of times high score to date has been exceeded
 11. Number of Credits On Game
- ...Credit button.

*Resets to 100,000 by pressing reset switch on coin door or

S-33 on MPU board, can be incremented 10,000 points for each depression of the credit button. By pressing the credit button to increment replay level by 10,000 until the one million score is passed. AT this point any level showing on the display will actually be one million + the level. Eliminating the 1st replay level eliminates all the replay levels because the 2nd level cannot be reached until the 1st level has been achieved, and the 3rd level cannot be reached until the 2nd level has been achieved. TO AVOID ACCIDENTALLY SETTING REPALY LEVELS AT OVER ONE MILLION ALWAYS PRESS THE COIN DOOR RESET SWITCH OR S33 ON THE MPU BOARD FIRST WHEN LOWERING LEVELS.

When reading counters 1 through 5, 10 and 11 do not include the units digit which is always zero.

V. GAME ADJUSTMENTS

A. PLAYFIELD ADJUSTMENTS

The left and right outlane openings are adjusted by moving the adjacent post back or forward in its slot. A smaller opening to the outlane will increase playing time and scoring.

B. VOLUME ADJUSTMENT

The volume control for the microprocessor sound unit is located on the Tilt Block assembly in the cabinet and may be accessed through the coin door. Turning the control clockwise increases volume, counter-clockwise decreases volume.

C. MPU SET UP SWITCHES

The MPU P.C. board has 32 set up switches that allow play to be customized to the location. The switches are contained in four switch packs numbered S1-8, S9-16, S17-24 and S25-32. Switch selectable options are credits per coin, tune options, maximum credits allowed, 3 or 5 balls per game option, replay or free ball award, match feature, and credits for exceeding high score.

CREDITS/COIN ADJUSTMENT

S9 through S12 select the credits per coin chute 2. Switch setting and resultant per coin as follows:

S12	S11	S10	S9	CREDITS/COIN
OFF	OFF	OFF	OFF	SAME AS COIN CHUTE #1 SETTING
OFF	OFF	OFF	ON	1/1 COIN
OFF	OFF	ON	OFF	2/1 COIN
OFF	OFF	ON	ON	3/1 COIN
OFF	ON	OFF	OFF	4/1 COIN
OFF	ON	OFF	ON	5/1 COIN
OFF	ON	ON	OFF	6/1 COIN
OFF	ON	ON	ON	7/1 COIN
ON	OFF	OFF	OFF	8/1 COIN
ON	OFF	OFF	ON	9/1 COIN
ON	OFF	ON	OFF	10/1 COIN
ON	OFF	ON	ON	11/1 COIN
ON	ON	OFF	OFF	12/1 COIN
ON	ON	OFF	ON	13/1 COIN
ON	ON	ON	OFF	14/1 COIN
ON	ON	ON	ON	15/1 COIN

S1 through S5 select the credits per coun for chute 1.
 S17 through S21 select the credits per coin for coin chute 3.
 Switch settings and resultant credits per coin are identical for
 coin chutes 1 and 3 and are as follows:

CREDITS/COIN ADJUSTMENTS

COIN CHUTE #1	SWITCHES					CREDITS/COIN
	5	4	3	2	1	
	21	20	19	18	17	
	OFF	OFF	OFF	OFF	OFF	3/2 COINS
	OFF	OFF	OFF	OFF	ON	3/2 COINS
	OFF	OFF	OFF	ON	OFF	1/ COIN
	OFF	OFF	OFF	ON	ON	1/2 COINS
	OFF	OFF	ON	OFF	OFF	2/ COIN
	OFF	OFF	ON	OFF	ON	2/2 COINS
	OFF	OFF	ON	ON	OFF	3/ COIN
	OFF	OFF	ON	ON	ON	3/2 COINS
	OFF	ON	OFF	OFF	OFF	4/ COIN
	OFF	ON	OFF	OFF	ON	4/2 COINS
	OFF	ON	OFF	ON	OFF	5/ COIN
	OFF	ON	OFF	ON	ON	5/2 COINS
	OFF	ON	ON	OFF	OFF	6/ COIN
	OFF	ON	ON	OFF	ON	6/2 COINS
	OFF	ON	ON	ON	OFF	7/ COIN
	OFF	ON	ON	ON	ON	7/2 COINS
	ON	OFF	OFF	OFF	OFF	8/ COIN
	ON	OFF	OFF	OFF	ON	8/2 COINS
	ON	OFF	OFF	ON	OFF	9/ COIN
	ON	OFF	OFF	ON	ON	9/2 COINS
	ON	OFF	ON	OFF	OFF	10/ COIN
	ON	OFF	ON	OFF	ON	10/2 COINS
	ON	OFF	ON	ON	OFF	11/ COIN
	ON	OFF	ON	ON	ON	11/2 COINS
	ON	ON	OFF	OFF	OFF	12/ COIN
	ON	ON	OFF	ON	ON	12/2 COINS
	ON	ON	OFF	ON	OFF	13/ COIN
	ON	ON	OFF	OFF	ON	13/2 COINS
	ON	ON	ON	OFF	OFF	14/ COIN
	ON	ON	ON	ON	ON	14/2 COINS
	ON	ON	ON	ON	OFF	15/ COIN
	ON	ON	ON	ON	ON	15/2 COINS

FREE PLAY OPTION

The game has provision for allowing free play. When the
 free play is on, credits are decremented normally until 0 credits,
 then pressing the credit button puts 99 credits on the game and

they continue to be decremented.

FREE PLAY	S8
ON	ON
OFF	OFF

SOUND OPTION

The game is designed to play a sound for each credit incremented from the coin switch, start of game and power up/game over. The first two sounds are selectable by S16, however the power up/game over sound is always enabled. When the sound switch is off, the coin and start of game sounds are replaced by a single chime or eliminated.

SOUNDS	S16
ON	ON
OFF	OFF

MAXIMUM CREDITS

The maximum number of credits that will be accepted by the game either through the coin switch or replay award are controlled by S25, S26 and 27. Switch Settings are as follows.

MAXIMUM CREDITS	SWITCHES		
	27	26	25
5	OFF	OFF	OFF
10	OFF	OFF	OFF
15	OFF	OFF	OFF
20	OFF	ON	OFF
25	ON	OFF	OFF
30	ON	OFF	ON
35	ON	ON	OFF
40	ON	ON	ON

BALLS PER GAME OPTION

# BALLS PER GAME	S28
5	ON
3	OFF

REPLAY OR FREE BALL AWARD

The game is designed to award either a replay or free ball at three selectable score levels or through specials gained during the play of the game.

AWARD	S29
REPLAY	ON
EXTRA BALL	OFF

MATCH FEATURE

When the match feature is ON, a random number appears in the ball in play display at game over. A replay is awarded if the number matches the tens digit in a player's score.

MATCH	S30
ON	ON
OFF	OFF

CREDITS FOR EXCEEDING HIGH SCORE

The game is designed to award replays for beating the previous high score to date.

The winning score becomes the new high score to date.

CREDITS	S32	S31
0	OFF	OFF
1	OFF	ON
2	ON	OFF
3	ON	ON

VI. ROUTINE MAINTENANCE ON LOCATION

The game is equipped with two separate diagnostic programs to aid in routine maintenance. The first test occurs automatically at power build up. The MPU board goes into its self-test routine, and upon successful completion plays the game over tune.

The second diagnostic program is accessed by depressing the test switch inside the front cabinet door.

NOTE: THE GAME MUST BE IN THE GAME OVER MODE.

1. Depress the test switch twelve times to access the diagnostic routine. The score display will extinguish and all feature lamps will flash. Check for burned out lamps at this time.
2. Depress the test switch again to start the score display checkout. All digits except the units digits will count through 0-9.
3. Depress the test switch again to begin the solenoid checkout. Each solenoid will actuate individually and show its number on the score displays. Refer to table 1 of repair section for solenoid numbers.
4. Depress the test switch again to start the switch Checkout. Any closed switch will show its number on the score display. Refer to table 2 of the repair section for switch numbers.

NOTE: THE BALL SHOULD NOT BE IN THE OUTHOLE DURING THIS TEST.

Depressing the test switch again puts the game back in the game over mode. The diagnostic routine should be exercised on a regular basis to ensure proper operation of the game.

REPAIR

I. INTRODUCTION

Repair of the game on location is by printed circuit board, solenoid, switch, or lamp replacement, or by cable harness repair. No special tools or equipment are required other than a standard soldering iron, hand tools and volt/ohmmeter.

Troubleshooting faults in the game is aided by the use of the two built in diagnostic routines. The first test is initiated automatically at power up as the MPU board exercises its self diagnostic routine. As each section of the MPU board is checked, the red LED located near the top of the board flashes for successful completion of each test. After six flashes, the game over tune plays to indicate correct MPU operation.

The second diagnostic program is entered by pressing the test switch inside the front cabinet door. Pressing the test switch 12 times will step through all the accounting functions and put the game into the diagnostic program. All feature lamps should flash. Pressing the test switch again causes the display to sequence from 0 through 9. Pressing the switch again causes all the solenoids to sequence. Refer to table 1 for solenoid numbers. Pressing the switch again causes closed switch to be displayed. Refer to table 2 for switch numbers. Pressing the test switch again will put the game back in the game over mode.

II. MODULE REPLACEMENT DIAGNOSTICS

SYMPTON 1. Power up LED does not flash 6 times. General illumination lamps do not light.

CAUSE

PROCEDURE

A. Power Supply Incorrect

Refer To Power Supply
Diagnostics.

SYMPTOM 2. Power up LED does not flash 6 times. General illumination lamps do light.

<u>CAUSE</u>	<u>PROCEDURE</u>
A. +5V Incorrect	Measure +5V \pm .25V at TP1 of MPU board. If incorrect refer to power supply diagnostics.
B. 24VDC Incorrect	Measure 24VDC \pm 6V at J1-3 of MPU Board. If incorrect refer to power supply diagnostics. If correct replace MPU Board.

SYMPTOM 3. Power up LED flashes 6 times, game over tune does not play correctly.

<u>CAUSE</u>	<u>PROCEDURE</u>
A. Incorrect output from MPU Board.	Replace MPU Board
B. Faulty Sound Board	Replace Sound Board

SYMPTOM 4. One or more but less than 15 feature lamps do not light.

<u>CAUSE</u>	<u>PROCEDURE</u>
A. Burned Out Bulb	Replace bulb
B. Faulty lamp driver board	Replace lamp driver board

SYMPTOM 5. More than 15 lamps do not light.

<u>CAUSE</u>	<u>PROCEDURE</u>
A. Faulty Lamp Driver Board	Replace Lamp Driver Board

SYMPTOM 6. One display board shows incorrect data during sequencing.

CAUSE

PROCEDURE

- | | | |
|----|-------------------------|-----------------------|
| A. | Faulty Display Board | Replace Display Board |
| B. | Faulty MPU Board Output | Replace MPU Board |

SYMPTOM 7. All display boards show incorrect data during sequencing.

CAUSE

PROCEDURE

- | | | |
|----|-------------------------|-------------------|
| A. | Faulty MPU Board Output | Replace MPU Board |
|----|-------------------------|-------------------|

SYMPTOM 8. One solenoid does not operate.

CAUSE

PROCEDURE

- | | | |
|----|------------------------------|-------------------------|
| A. | Faulty Solenoid | Replace Solenoid |
| B. | Faulty Solenoid Driver Board | Replace Solenoid Driver |

SYMPTOM 9. More than one solenoid does not operate.

CAUSE

PROCEDURE

- | | | |
|----|------------------------------|-------------------------------|
| A. | Faulty Solenoid Driver Board | Replace Solenoid Driver Board |
| B. | Faulty MPU Board Output | Replace MPU Board |

SYMPTOM 10. None of the solenoids operate.

CAUSE

PROCEDURE

- | | | |
|----|---------------------------|-------------------------|
| A. | +24V missing at solenoids | Check +24V at solenoids |
|----|---------------------------|-------------------------|

If incorrect look for broken wire between +24V at power supply and solenoids and refer to power supply diagnostics.

CAUSE

PROCEDURE

B. +5V missing at solenoid driver board

Check +5 at solenoid driver board. If incorrect look for broken wire between +5V at power supply and solenoid driver board.

C. Faulty solenoid driver board Replace solenoid driver Board

SYMPTOM 11. Switch always closed.

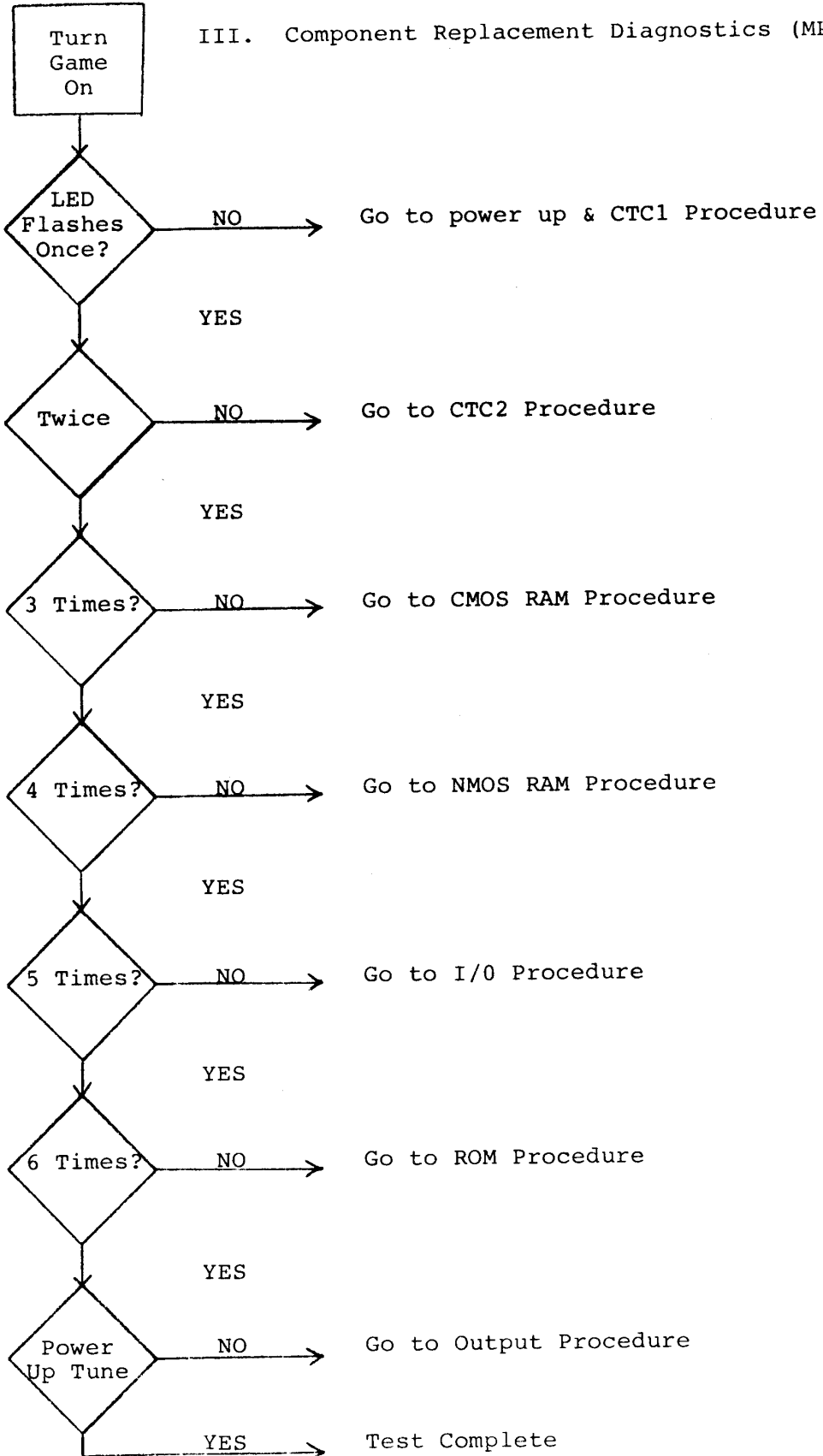
CAUSE

PROCEDURE

A. Stuck Switch

Locate switch from switch identification table and repair or replace switch.

III. Component Replacement Diagnostics (MPU Board)



COMPONENT REPLACEMENT

A. Power Up and CTC1 Procedure

<u>CAUSE</u>	<u>PROCEDURE</u>
+5V Incorrect	Measure +5V \pm .25V at TP1 of MPU board. If incorrect refer to power supply diagnostics.
+24VDC Incorrect	Measure +24VDC \pm 6V at J1-3 of MPU board. If incorrect refer to power supply diagnostics.
Reset Incorrect	<ol style="list-style-type: none">1. Check for positive reset pulse at pin 35 of U17. If incorrect and negative reset pulse is present at TP4, replace QC. If no negative reset pulse is present at TP4, trace back through QD, QA, QB, U5 and U3 for defect.2. Check for negative reset pulse at pin 17 of U10 and pin 26 of U11. If one or both are incorrect and a negative reset pulse is present at TP4, look for open or shorted foil run.

If both are incorrect and no negative reset pulse present at TP4, trace back through QD, QA, QB, U5 and U3 for defect.

- D. Oscillator Incorrect Check TP5 for a square wave with a period of about 400ns. If Incorrect trace back through U3 to the crystal.
- E. LED Circuit Defective Check for positive pulse at base of QE. If present replace QE. If operation still incorrect replace LED.
- F. U10, U11, U17, U6, U7, Replace one at a time with
 U8, U12, U13, U26, U24, known good parts until fault
 U25, U4, U3, or U9 defect- is cleared.
 ive.

CTC2 PROCEDURE

CAUSE

PROCEDURE

CTC zero cross over input incorrect. Check pin 21 or U10 for positive zero cross over pulse. If incorrect trace back through U3 and U2.

U10 Defective

Replace U10 with known good I.C.

U3 Defective Replace U3 with a known good I.C.

U11, U6, U7, U8, U12, U13, U26 or U17 defective Replace one at a time with known good parts until fault is cleared.

C. CMOS RAM Procedure

CAUSE

PROCEDURE

CMOS RAM Defective

Replace U6 and U7, one at a time.

CMOS Gate Defective

Replace U9.

D. NMOS RAM Procedure

CAUSE

PROCEDURE

NMOS RAM Defective

Replace U8

NMOS RAM Chip Select Defective

Replace U5 and U24, one at a Time.

E. I/O Procedure

CAUSE

PROCEDURE

I/O Defective

Replace U17

I/O chip select gate defective

Replace U4

F. ROM Procedure

CAUSE

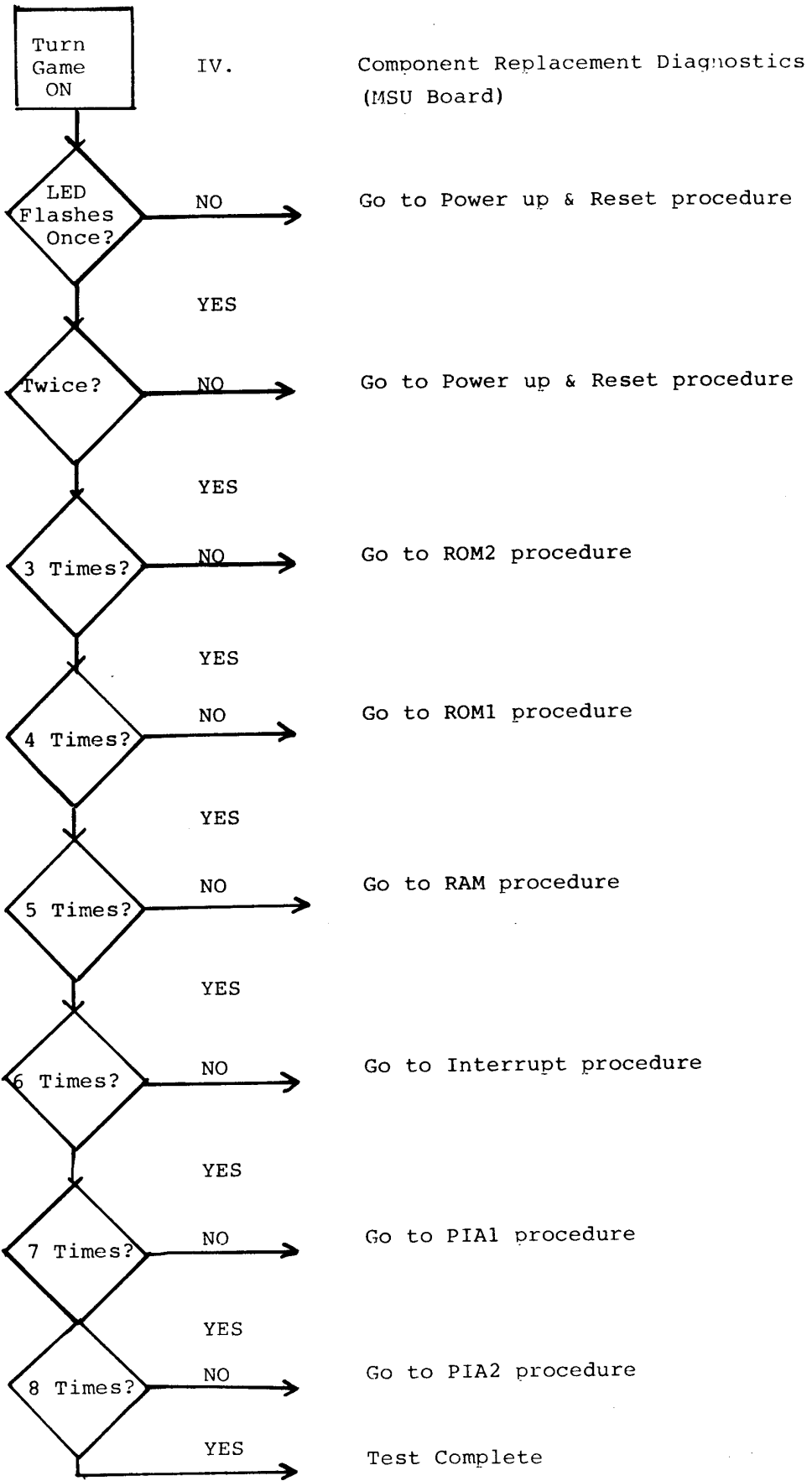
PROCEDURE

ROM Defective

Replace U12, U13 and U26, one at a time

G. OUTPUT PROCEDURE

<u>CAUSE</u>	<u>PROCEDURE</u>
U14, U16, U20, U21, U15, U19, U22, U18 or U23 Defective	Replace on at a time with known good parts.



A. Power Up and Reset Procedure

<u>CAUSE</u>	<u>PROCEDURE</u>
+12V Incorrect	Check for +12V \pm 2V At TP4. If incorrect refer to power supply diagnostics.
+5V Incorrect	Check for +5V \pm .25V at TP3. If incorrect refer to power supply diagnostics.
LED Circuit Defective	If LED is out: Ground Pin 8 of U16. If LED does not turn on replace LED. If LED is on: check logic level at Pin 9 of U16. If low replace U16.
Reset Incorrect	Check TP2 for negative going pulses at \sim 10Hz Rate. If pulses present replace U6. If reset still not correct replace U9, then U7. If still incorrect check for shorted data or address lines, If no pulse at TP2 check logic level at Pin 4 of U4. If high replace U8. If low replace U4.
Clock Oscillator Incorrect	Check TP6 For \sim 900Hz Square wave. If not present replace U6. If still not correct replace crystal.

B. ROM2 Procedure

<u>CAUSE</u>	<u>PROCEDURE</u>
Defective ROM Chip	Replace U10
Address Decoder Defective	Replace U7

C. ROM 1 Procedure

<u>CAUSE</u>	<u>PROCEDURE</u>
Defective ROM Chip	Replace U9
Address Decoder Defective	Replace U7

D. RAM Procedure

<u>CAUSE</u>	<u>PROCEDURE</u>
Defective RAM Chip	Replace U8
Address Decoder Defective	Replace U7

E. Interrupt Procedure

<u>CAUSE</u>	<u>PROCEDURE</u>
Oscillator Defective	Check for negative going pulses (400Hz Rate) at TP5. If no pulses present replace U1.
PIA1 Defective	Check for pulses at Pin 18 of U5. If present replace U5.

F. PIA1 Procedure

<u>CAUSE</u>	<u>PROCEDURE</u>
Improper Input from MPU	Unplug J1 of MSU board. If problem corrected refer to MPU diagnostics.
PIA Defective	Replace U5
Address Decoder Defective	Replace U7

CAUSE

PROCEDURE

Fuse Blown (8VAC)
defective bridge

Replace Fuse.
Check 8 VAC. If correct, replace
bridge with known good part.

SYMPTOM 5. AC voltage incorrect on one or more, but not all
secondary windings.

CAUSE

PROCEDURE

Defective Transformer Winding

Remove fuse from defective
secondary. If voltage still incorrect
replace transformer. If voltage
comes up, disconnect all PC boards
that the winding goes to, reinsert
fuse and plug PC boards back until
defect reappears.

SYMPTOM 6. No secondary AC voltage at transformer, primary
voltage correct.

CAUSE

PROCEDURE

Defective Transformer

Replace with known good transformer.

V. SOLENOID AND SWITCH IDENTIFICATION

A. TABLE 1.
SOLENOID IDENTIFICATION

The solenoid checkout section of the diagnostic routine actuates each solenoid on the playfield. The solenoid number is shown in each display as the solenoid is being actuated. The following list identifies each solenoid by number:

Ball return	010
Upper Left Thumper.....	020
Upper Right Thumper.....	030
Kickout Hole.....	040
Drop Targets.....	050
Sling Shot.....	060
Top Lower Thumper.....	070
Bottom Lower Thumper.....	080
Not Used.....	090
Not Used.....	100
Not Used.....	110
Not Used.....	120
Not Used.....	130
Not Used.....	140
Not Used.....	150
Flipper Relay Enable.....	160
Feature Lamps On.....	170
Feature Lamps Off.....	180

SWITCH IDENTIFICATION

B. Table 2

In the switch checkout section of the diagnostic routine the number of the closed switch is shown in each display. Closing any switch causes its number to be displayed. The following list identifies each switch by number.

SWITCH FUNCTION

Accounting Reset.....	010
Credit Button.....	020
Slam Switch.....	030
Drop Target "T".....	040
Coin Chute 2.....	050
Coin Chute 3.....	060
Coin Chute 1.....	070
Tilt Switch.....	080
10 Pt. Score Switches.....	090
Drop Target "E".....	100
Ball Return.....	110
A Lane.....	120
R Lane.....	130
P Lane.....	140
Sling Shot.....	150
Lower Extra When Lit.....	160
Drop Target "R".....	170
Lower Special When Lit.....	180
Top Stand Up Target.....	190
Lower Stand Up Target.....	200
Upper Left Thumper.....	210
Upper Right Thumper.....	220
Spinner.....	230
Kickout Hole.....	240
Diagnostic and Accounting.....	260
Loop Lane Sw. 5.....	300
Drop Target "S".....	310
Drop Target "H".....	320
Top Lower Thumper.....	330
Bottom Lower Thumper.....	340
Drop Target "O" (Left).....	350
Drop Target "O" (Right).....	360
S Lane.....	370
H Lane.....	380
50,000 Pt. Lane.....	390
1000 And Advance Lane.....	400

